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FI Missouri Remediation Trust

October 26, 2017

Mrs. Elizabeth Hagenmaier
U.S. Environmental Protection Agency
Superfund Division,
11201 Renner Blvd
Lenexa, KS 66219

Re: Administrative Settlement and Order on Consent for Treatability Study ("TS"), Docket No. CERCLA -07-2016-0004 (the "Settlement")
FI Missouri Remediation Trust Property, Joplin, Missouri

Mrs. Hagenmaier:

Pursuant to paragraph 46 of the Settlement, the Farmland Industries Remediation Trust (the "Trust") hereby submits for EPA review and approval this final report summarizing the actions taken to comply with the Settlement. Under the Work to Be Performed, the Trust was required to perform the actions set forth in the January 7, 2016 Treatability Study Work Plan (the "TS Work Plan"). In accordance with the Settlement and the TS Work Plan, the Trust completed the following actions as set forth below and in the attached exhibits:

Installation of Temporary Monitoring Wells (TS Work Plan at p. 2). The completion of the installation of five temporary monitoring wells in accordance with the TS Work Plan on June 11-12, 2016 is described in the January 9, 2017 Phase 1 Dye Trace Test Summary Report (the "Dye Trace Report") at p. 2 (attached hereto as Exhibit A).

Installation of Injection Well (TS Work Plan at p. 2). The completion of the installation of the injection well in accordance with the TS Work Plan is described in the Dye Trace Report at p. 2 (Exhibit A hereto).

Background Sampling for Florescence dyes selection (TS Work Plan at p. 2). The completion of the background sampling for florescence dye selection to determine the appropriate dye to be selected for the composition and chemistry of the water and the system being tested at the Gypstack is described in the Dye Trace Report at pp. 2-3 (Exhibit A hereto). The dyes Fluorescein and Sulphorhodamine B were selected based on the background sampling.

Conduct Dye Trace Test and Post-Injection Monitoring Following Dye Injection. The completion of the dye trace test and the post-injection monitoring following dye injection is described in the Dye Trace Report at pp. 1, 3-5 (Exhibit A hereto). The TS

Work Plan originally contemplated conducting the dye trace test in two phases. As noted in the Dye Trace Report, the first phase of the dye trace test started on June 2, 2016 when Sulphorhodamine B was injected in IW-1 and Fluorescein was discharged into the catch basin at the MH1W discharge point. After injection, samples were collected weekly for four events, bi-weekly for two events, and monthly for three events for a total duration of 165 days. See Dye Trace Report at 1. Based on the results of phase 1 of the dye trace test, the Trust, EPA and MDNR agreed on not performing the second phase of the dye trace test. In addition, rather than conduct a Long Term Leachate Treatability Alternatives Evaluation and Leachate Treatability Alternative Report as originally contemplated in the TS Work Plan, the Trust, MDNR and EPA agreed, based on the results of the first phase of the dye trace test, to proceed with construction of inflow reduction measures. Dye Trace Report at pp. 5-6.

Inflow Reduction Measures. On March 9, 2017, the Trust submitted plans for implementation of inflow reduction measures in the form of plans and specifications for construction of a lateral drain system (the "IRM Plans"). MDNR and EPA approved the IRM Plans and the Trust attempted to implement the IRM Plans from April 16-27, 2017. The May 31, 2017 Construction Summary Report, Lateral Drain System (the "LDS Report") describes those efforts. See Exhibit B hereto. As set forth in the LDS Report, the attempt to implement the IRM Plans in April 2017 was unsuccessful and the EPA and MDNR decided to allow the Trust to abandon the lateral drain system project embodied in the IRM Plans. See LDS Report at p. 7.

As noted in the October 10, 2017 Monthly Report for activities in September 2017 (the "October Report")(Exhibit C hereto) and as summarized above and in the attached exhibits to this Final Report, all TS Work Plan activities have either (a) been completed or (b) been rendered moot by site conditions. Accordingly, the Trust respectfully submits that it is now appropriate for EPA to issue a notice of completion of work pursuant to paragraph 109 of the Settlement. Please note that paragraph 47 of the Settlement provides for continued site access to the agencies for two years after notice of completion of the Work is issued under paragraph 109. Please let me know if it would be helpful to set up a meeting to discuss this Final Report and issuance of a notice of completion. In the meantime, do not hesitate to let me know if you have any questions. Thanks for your consideration and continued attention to this matter.

Mrs. Elizabeth Hagenmaier
October 26, 2017
Joplin, MO

If you have questions concerning this report or require additional information, please contact me at 913-317-2623.

Sincerely,

A handwritten signature in blue ink that reads "Kamyar Manesh". The signature is fluid and cursive, with the first name "Kamyar" and last name "Manesh" clearly distinguishable.

Kamyar Manesh, P.E.
Trust Administrator
FI Missouri Remediation Trust

CC: Donald Van Dyke, MDNR, Hazardous Waste Program
Steve Kemp, EPA R7
Todd Campbell, EPA R7
Mark Finney, APTIM



Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/17/2017

Description: Photo 1
Pre-construction
North End of Trench near
Short Creek

Direction: North



Description: Photo 2
Pre-Construction
North Trench

Direction: North





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/17/2017

Description: Photo 3
Pre-construction Trench

Direction: South



Description: Photo 4
Pre-construction Trench

Direction: North



Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

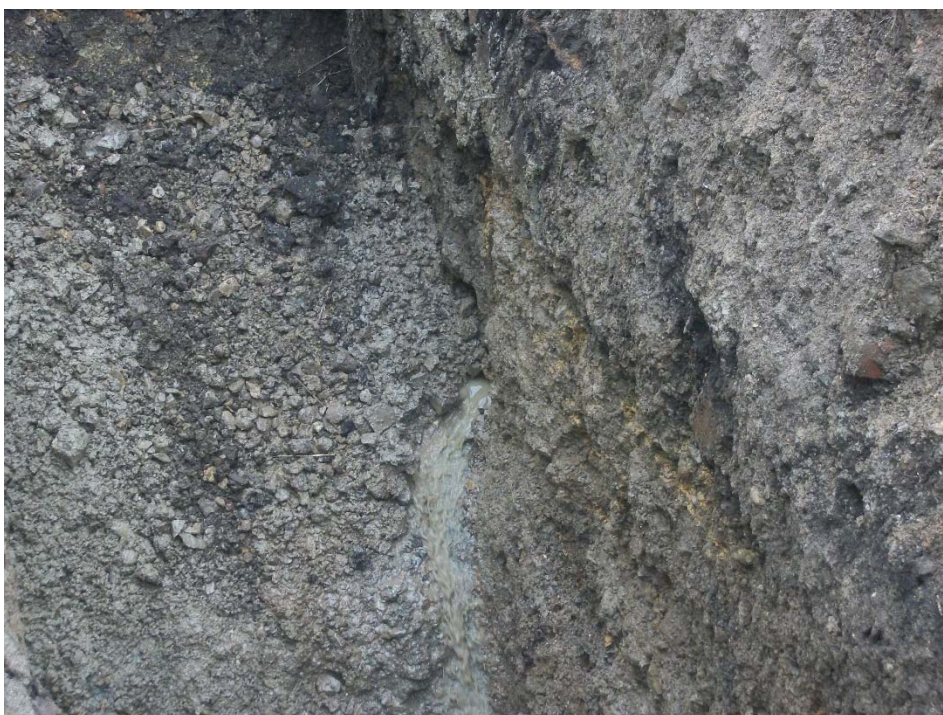
Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/17/2017

Description: Photo 5
North Trench –
Began Excavating
Direction: South



Description: Photo 6
North Trench – Seep
Direction: Southwest





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/17/2017

Description: Photo 7
North Trench - Inflow

Direction: Southwest



Description: Photo 8
North Trench - Full

Direction: South





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/17/2017

Description: Photo 9
Tree Removal

Direction: South



Description: Photo 10
South Trench – Weathered
Shale/Chert

Direction: North





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/18/2017

Description: Photo 11
South Trench

Direction: North



Description: Photo 12
South Trench Collapse

Direction: South





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/18/2017

Description: Photo 13
Short Creek – Before
Cleanout

Direction: West



Description: Photo 14
Short Creek - After
Cleanout

Direction: West





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/18/2017

Description: Photo 15
South Trench – Water
Management

Direction: South



Description: Photo 16
South Trench - Water
Management

Direction: South





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/24/2017

Description: Photo 17
South Trench – April 24,
2017 (Collapse)

Direction: North



Description: Photo 18
South Trench - April 24,
2017

Direction: South





Photographic Documentation

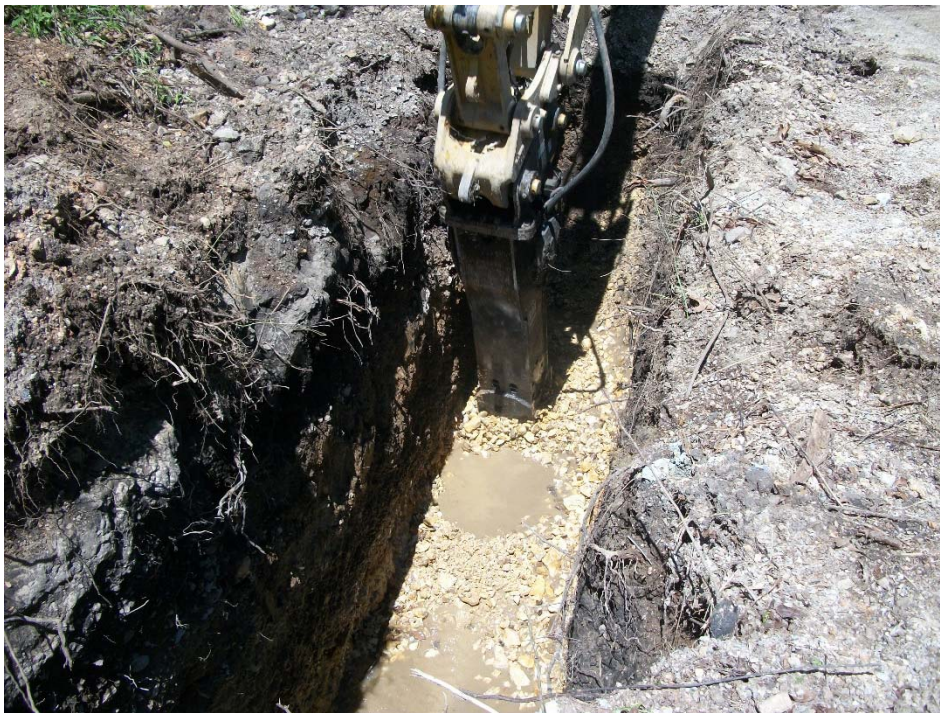
Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/24/2017

Description: Photo 19
South Trench – Rock
Hammer

Direction: North



Description: Photo 20
South Creek – Water
Management

Direction: South





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/25/2017

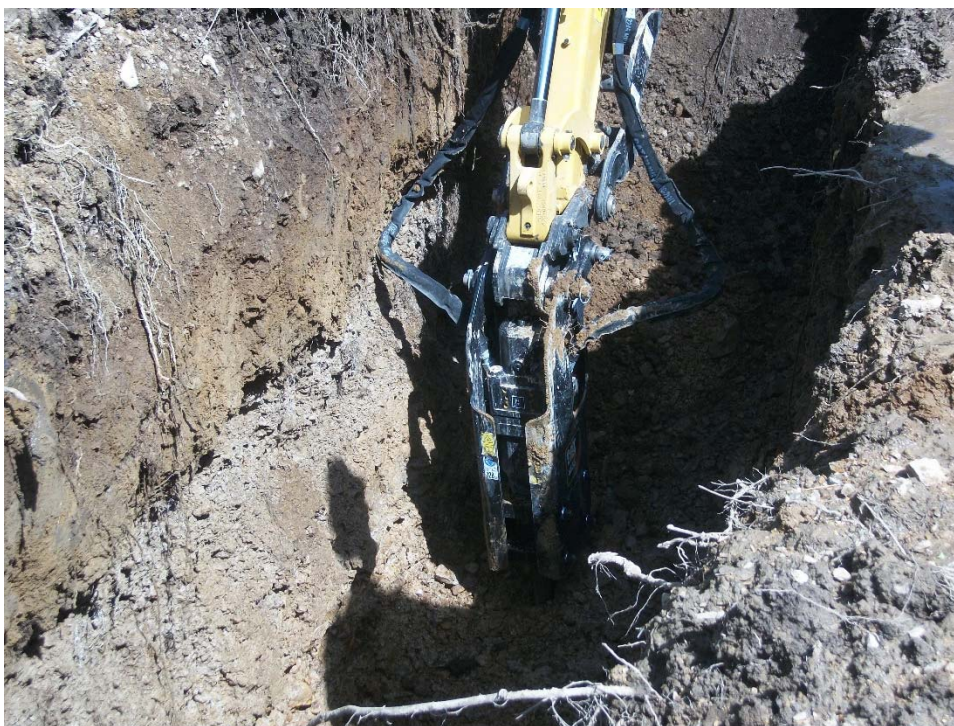
Description: Photo 21
South Trench – Water
Management, 6-inch
Pump, seeps

Direction: South



Description: Photo 22
South Trench – Rock
Hammer

Direction: North





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/25/2017

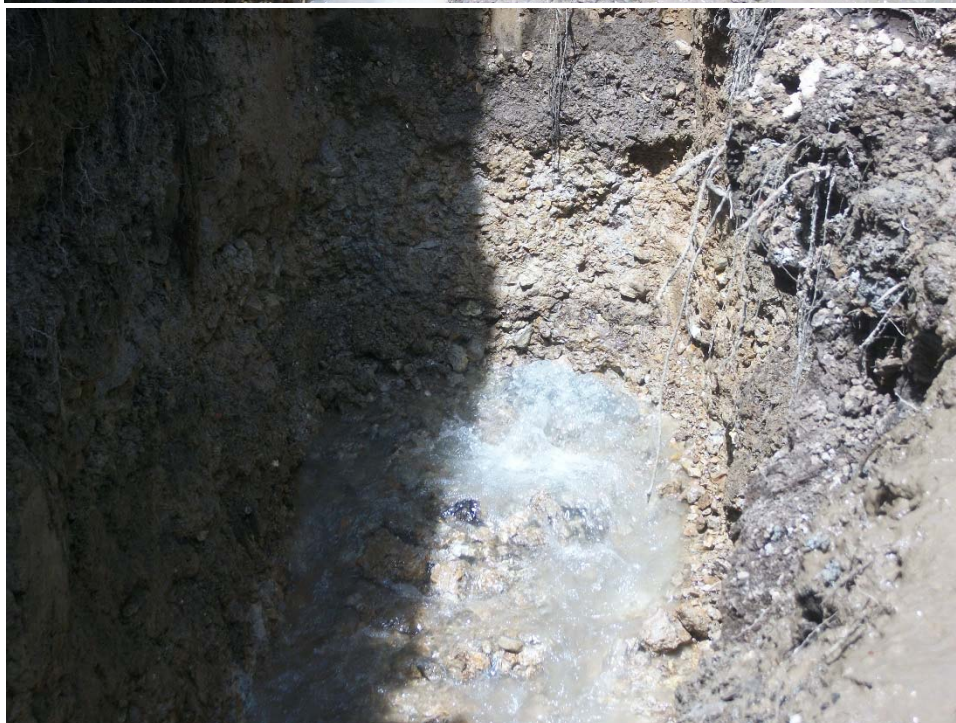
Description: Photo 23
South Trench – High
Inflow

Direction: North



Description: Photo 24
South Trench – High
Inflow, End of Trench

Direction: North





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/25/2017

Description: Photo 25
South Trench

Direction: North



Description: Photo 26
South Trench - Flooded

Direction: North





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/25/2017

Description: Photo 27
South Trench – High
Inflow

Direction: North



Description: Photo 28
South Trench – High
Inflow

Direction: North



Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/25/2017

Description: Photo 29
South Trench –
Backfilling

Direction: South



Description: Photo 30
South Trench - Backfilled

Direction: North



Photographic Documentation



Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/26/2017

Description: Photo 31
North Trench - Open

Direction: North



Description: Photo 32
North Trench - Backfilled

Direction: North





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/26/2017

Description: Photo 33
Short Creek – High Water

Direction: West



Description: Photo 34
Short Creek Crossing –
Damaged

Direction: South





Photographic Documentation

Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/26/2017

Description: Photo 35
Short Creek Crossing -
Repaired

Direction: North



Description: Photo 36
Short Creek Crossing -
Top Berm

Direction: North



Photographic Documentation



Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/11/2017

Description: Photo 33
Beaver Pond

Direction: SSE

Description: Photo 34

Direction: No Photograph

Photographic Documentation



Location: Former Farmland Industry Site
Joplin, MO

Shaw Project Number: 108732
Photographer: Mark Finney

Client: FI Missouri Remediation Trust
Date: 4/11/2017

Description: Photo 33
Beaver Pond

Direction: SSE

Description: Photo 34

Direction: No Photograph



CB&I
11206 Thompson Avenue
Lenexa, KS 66219
913-451-1224
Fax: 913-317-2660

May 31, 2017

Mr. Don Van Dyke, Project Manager
Superfund Section
Hazardous Waste Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

Mr. Mark Doolan, Remedial Project Manager
Superfund Section
U.S Environmental Protection Agency
Region 7
11201 Renner Blvd
Lenexa, KS 66219

RE: Construction Summary Report
Lateral Drain System
Former Farmland Industries Site
Joplin, Missouri

Dear Don and Mark:

On behalf of the FI Missouri Remediation Trust (Trust), CB&I Environmental & Infrastructure (CB&I), is pleased to submit the summary of the construction activities associated with the lateral drain system at the former Farmland Industries site located in Joplin, Missouri. The lateral drain system construction activities were conducted in accordance with the approved lateral drain system plans and specifications submitted on March 9, 2017. The lateral drain system was proposed to divert the flow of groundwater that entered the gypstack in the vicinity of the northeast portion of the gypstack to the adjacent Short Creek; whereby, reducing the inflow of groundwater and the subsequent generation of leachate. The construction of the lateral drain was abandoned due to the inflow of possibly leachate in the vicinity of the former Short Creek channel.

In 2014, the EPA began utilizing the gypstack as a repository for mine waste impacted soil from the City of Joplin and nearby Oronogo-Duenweg Mine Belt Superfund Sites. The EPA plans to use the Gypstack for another 5 years as a repository and to construct an engineered cover over the Gypstack following the completion of the project. Since the start of the project in 2014, several feet of cover have been placed on top of the gypstack. This has significantly reduced the amount of infiltration to the Gypstack due to direct precipitation. A diversion ditch was constructed along the northeast and east extent of the gypstack to divert surface water flow to an outlet structure located on the east extent of the gypstack. It is believed that significant infiltration occurs along this feature following periods of heavy precipitation.

In June 2016, Sulforhodamine B (SR-B) was injected at IW-1 to evaluate the flow of groundwater beneath the gypstack along the former Short Creek channel or following bedrock flowpaths to emerge in Shock Creek downstream of SC-4 and upstream of SC-5. Historic illustrations of the former Short Creek channel indicated that the former channel would intersect the existing channel near SC-2 and between SC-4 and SC-5.

The results of the dye test indicated that the groundwater flow beneath the Gypstack travels at a relatively high velocity from east to west beneath the north extent of the gypstack presumably along the former Short Creek channel. Dye injected along the northeast extent of the Gypstack was observed at two locations, SC-2 and SC-5, but absent in the intermediate sample locations SC-3 and SC-4. Sample locations SC-2 and SC-5 were located near the presumed location of the former Short Creek channel. The groundwater flow velocity ranged from 25 to 192 feet/day at SC-2 and SC-5, respectively.

Purpose

The purpose of this report is to document the construction of the lateral drain system. This Construction Summary Report provides a summary of the work performed to construct the lateral drain system. The following sections of this report provide a general chronology and description of the major construction activities, variances from the original design, and quality control/quality assurance activities performed.

Scope

The proposed design of the lateral drain system included a French drain along the east extent of the gypstack in an effort to reduce hydraulic head and groundwater flow from migrating beneath the gypstack. The French drain was designed to extend from Short Creek near the crossing south approximately 485 feet and located between the east toe of the gypstack and the gravel access road. The average depth of the trench was approximately 13 feet bgs and 3 feet wide. The trench will be lined on the bottom, back and side walls with 40 mil low density polyethylene (LDPE) liner. The trench will key into bedrock and the bottom section of liner grouted in place to improve the bottom seal. The trench will be backfilled with gravel to an approximate elevation of 909 feet. Two perforated drain lines will be installed in the gravel at an approximate elevation approximately 1 foot above the low water line of the creek. A backflow prevention valve will be installed on the drain discharge line to prevent the backflow of surface water during periods of high stage in the creek.

Previous borings indicate that the top of bedrock ranges from 10 to 13 feet bgs at most locations with a maximum depth of 17.5 feet bgs. The invert of Short Creek has an elevation of 906 feet at the crossing with the typical top of bedrock elevation of 900 feet or greater.

Documentation and Photographs

Photographs were taken throughout the duration of the lateral drain system installation to document the construction activities. A record of the photographs is provided in **Appendix A**.

Construction Activities

April 17, 2017

On April 17, 2017, CB&I and ER mobilized to the site for the construction of the lateral drain system. ER mobilized a two man crew, equipment and selected materials. Equipment and materials were staged in the laydown area located near the Short Creek crossing. Site preparation was completed and trench excavation was started. Photographs 1 through 10.

Equipment:

- CAT 323F Excavator with two buckets
- CAT 289D Skid loader

Materials:

- 1 roll, 500 feet of 40 mil LLPDE liner
 - 10, 8-inch PVC 45° fittings
 - 10, 8-inch PVC Wye-fittings
 - 2, 8-inch dia. x 20 foot HDPE Pipe
 - 1 roll, xxx feet of 8-inch perforated HDPE flex pipe
 - 2, duck bill flexible check valves
 - 2, 8-inch flexible to ridged HDPE pipe adapters
 - 2, 2x2x4 foot concrete blocks
-

Site Preparation

Trees and woody vegetation were cleared along the west side of the access road from Short Creek to gypstack letdown structure, approximately 450 feet. The vegetation was placed on top of the gypstack for consolidation. Preconstruction conditions are documented in Photographs 1 through 4. Tree removal is documented in Photograph 9.

Trench Excavation

Excavated from STA 3+53 to 4+04, Photograph 5. A high volume of water, estimated at approximately 80 gpm, entered the excavation at STA 3+53, Photographs 6 and 7. The north excavation was discontinued until the MDNR and/or EPA project managers could be notified of high inflow condition to review options.

Excavated from STA 0+00 to 0+80. The average depth of the trench was 10 feet bgs. Hard excavating at depth due to tightly compacted chert gravel and boulders in a weathered shale matrix, Photograph 12. Encountered weathered limestone bedrock at 8 feet bgs near STA 0+80. No measureable quantities of water were observed.

Dewatering

At approximately 1630, water was encountered in the excavation near STA 3+53. At 1645, the water level in the north excavation rose to 4 feet bgs, Photograph 8. The trench was allowed to fill overnight to determine the static water level.

April 18, 2017

On site at 0655 to continue trench excavation. Gravel and rip rap were delivered to the site and staged in the laydown area. Dewatering was required due to the inflow of water near STA 1+86. Photographs 11 through 16.

Materials:

- 388.64 tons gravel drain rock
- 15.66 tons 1-inch base gravel
- 23.70 tons 6-inch rip rap

Rejected first load of rip rap, too large (18 to 24 inch diameter).

Trench Excavation

Excavated trench from STA 0+80 to 2+30, Photograph 10 and 11. The west bank of trench collapsed from STA 0+13 to 0+35 while excavating at STA 1+17, Photograph 12. The lower portion of the trench consisted of chert boulders in a weathered shale matrix. Water entered the trench near STA 1+86 at 7 feet bgs along a rock ledge.

Dewatering

At 1537, began dewatering near STA 1+20 using a 2-inch pump discharging water at approximately 80 gpm and near STA 1+60 using a 3-inch pump, Photographs 15 and 16.

pH of trench water:

- STA 4+00 – 6.33
 - Short Creek – 7.03
-

April 19, 2017

Arrived on site at 0700 to continue trench excavation. Additional pumps were required to dewater the trench for continued excavation activities. Two additional staff arrived on site from ER to operate dewatering pumps. Ordered a rock hammer for the CAT excavator due to encountering hard bedrock located above the proposed invert of the drain pipe.

Trench Excavation

At 0700, the depth to water in the trench at STA 4+00 was 4 feet bgs and 5 feet 7 inches at STA 2+25.

Excavated from STA 2+30 to 2+80. Encountered limestone at approximately 8 feet bgs between STA 2+60 and 2+80. High quantity of water entering the trench at STA 2+60 between 7 to 8 feet bgs.

Dewatering

At 0845, began discharging from trench at STA 1+20 using a 2-inch pump.

At 1110, began discharging from trench at STA 2+00 using a 3-inch pump.

Both pumps combined are not able to dewater the trench.

At 1500, began discharging from trench at STA 2+60 using a second 3-inch pump.

April 20, 2017

Arrived on site at 0645 to continue trench excavation activities. Currently raining with a forecast of heavy rains over the next 3 days with 3 to 5 inches of accumulation. Shut down for the weekend due to rain and lightning. Foley Equipment Rental delivered a rock hammer for the CAT excavator.

Equipment

- CAT 323F Excavator with two buckets
- CAT 289D Skid loader
- Rock hammer for CAT 323F Excavator

Trench Excavation

At 0645, the depth to water in the trench at STA 2+60 was 4 feet bgs.

Raining, heavy rains forecasted for the next 3 days. Flagged open excavation. Shut down work until Monday, April 20, 2017.

Dewatering

Pulled both 3-inch pumps and returned them to the rental company.

April 24, 2017

Arrived on site at 0900 to resume trench excavation activities. Heavy rains over the weekend resulted in damage to the south ramp of the creek crossing and the collapse of the south side of the trench from STA 0+03 to 0+70. Photographs 17 through 20.

Equipment:

- CAT 323F Excavator with two buckets
- CAT 289D Skid loader
- Rock hammer for CAT 323F Excavator

Material:

- 3 rolls of geotextile fabric, 180 inches by 360 feet, were delivered

Trench Excavation

The depth to water in trench at STA 4+00 was 23 inches bgs and 36 inches at STA 2+80, Photograph 18.

Excavated from STA 2+80 to 3+17. The trench from STA 0+03 to 0+70 collapsed over the weekend, Photograph 17. High volume of water continues to enter trench from STA 2+60 to 2+80. Excavate limestone bedrock down to 10.2 feet bgs using rock hammer on CAT excavator, Photograph 19.

Dewatering

At 0959, one, 2-inch and two, 3-inch pumps discharging water from trench. Three pumps are unable to dewater the trench from STA 0+00 to 3+17, Photograph 20.

pH of trench water:

- STA 2+60 – 5.49
- STA 4+00 – 7.00
- Short Creek – 7.06

April 25, 2017

Arrived onsite at 0650 to complete the excavation of the trench and start the installation of piping. At 1254, the MDNR project manager arrived on site. Construction activities, rain delays, and the high volume and low pH of water entering the gypstack side of the trench were discussed. The MDNR project manager notified the MDNR senior management and the EPA remedial project manager of the potential for leachate to enter the lateral drain system during periods of high precipitation and subsequently discharge to Short Creek. All parties agreed to abandon the trench and reassess the installation and design of the lateral drain system following the capping of the soil repository located on top of the gypstack. Photographs 21 through 30.

Equipment:

- A 6-inch pump was delivered to the site to manage water in the trench
- A CAT 304 with rock hammer was delivered to the site to improve efficiency while excavating trench and breaking bedrock

Trench Excavation

Excavated from STA 3+17 to 3+45. Multiple inflows observed along trench wall, Photograph 21. Very hard excavating due to limestone bedrock, Photograph 22. Encountered high inflow of water at STA 3+45, discharge approximately 80 to 100 gpm, Photographs 23, 24, 27, and 28.

Discussed construction options and the potential for the lateral drain system to discharge leachate into Short Creek particularly during periods following high precipitation events with the MDNR project

manager. The EPA remedial project manager was notified of the situation and all agreed to abandon the trench.

Backfilled the trench from STA 0+00 to 2+50 with previously excavated material, Photographs 25 and 29. The material was placed in lifts, compacted using the excavator bucket, and graded, Photograph 30.

Dewatering

At 0715, one, 2-inch and two, 3-inch pumps discharging water from trench. Three pumps are unable to dewater the trench from STA 0+00 to 3+17. Unable to dewater the trench due to high inflow of groundwater.

At 0853, began discharging water from the trench using the 6-inch pump and pulled the two, 3-inch pumps, Photographs 21 and 26. The water level in the trench began to decline.

pH of trench water:

- STA 3+15 – 6.04
- STA 4+00 – 6.78
- Short Creek – 7.30

April 26, 2017

Arrived onsite at 0708 to finished backfilling the trench and demobilize all equipment and materials from the site. Photographs 31 and 32.

Equipment

The following equipment was demobilized from the site.

- CAT 323F Excavator with two buckets
- CAT 289D Skid loader
- Rock hammer for CAT 323F Excavator
- CAT 304 with rock hammer
- 6-inch pump

Material

An attempt will be made to return all materials where possible. All materials were transported to STAR Plumbing for return.

Trench Excavation

Backfilled the trench from STA 2+50 to 3+53 and 3+87 to 4+04 with previously excavated material, Photographs 31 and 32. The trench was dewatered during the backfilling process using a 6-inch pump. Backfill material was placed in lifts and compacted using the excavator bucket. Difficulties were encountered backfilling the last portions of both trenches in the vicinities of high inflowing groundwater.

Dewatering

At 0720 resumed dewatering the trench using a 6-inch pump. The pump was moved ahead of the backfilling area to minimize the amount of water in the trench during the backfilling process. The dewatering and backfilling process were completed by 1201.

Creek Vegetation Clearing

On April 18, 2017, the vegetation and sediment from south bank of Short creek from low water crossing to east extent of the concrete fabric forms were excavated and placed on the south bank. This was conducted to widen the creek to improve the flow of surface water and reduce hydraulic head.

Preclearing conditions are documented in Photographs 13 and 14. High flow conditions following the creek clearing are documented in Photograph 33.

Road and Crossing Repair

On April 26, 2017, repairs were made to the south ramp of the Short Creek crossing. Runoff from recent rains eroded the ramp resulting in deep gullies and loss of gravel, Photograph 34. The ramp was graded and 1-inch gravel was placed on the ramp to provide a uniform surface and grade, Photograph 35. A gentle mound of gravel approximately 6 inches high was constructed at the top of the ramp oriented normal to the road to divert surface water flow around the ramp, Photograph 36.

Variances

The presumed top of bedrock was estimated at 10 to 13 feet bgs. Bedrock was encountered at 7 to 8 feet bgs at multiple locations during the trench construction. Weathered limestone was encountered at STA 1+86, 2+04, 2+30, 2+60 to 2+80, 3+50. A rock hammer was required to achieve the required elevation for the lateral drain pipe invert.

High inflows of groundwater were observed at STA 3+53 and 3+87, presumably the extents of the former Short Creek channel, and between STA 2+60 to 2+80 along a limestone shelf. The pH of the water within the trench varied, ranging from 5.49 (2+60) to 6.04 (3+15) and 6.78 to 7.00 (4+04). The low pH of the water observed in the trench suggest that leachate from the adjacent gypstack is entering the trench.

In flows at STA 3+53 and 3+87 were estimated at over 80 gpm. The design included a grout seal at the base of the LLDPE liner to minimize under flow from the gypstack side of the trench, but a competent seal could not be guaranteed under these inflow conditions. It is assumed that the high hydraulic head observed in the trench was the result of the infiltration of surface water in the east extent of the gypstack following periods of high precipitation. The site received heavy precipitation preceding and during the trench construction activities to include; 1.45 inches from April 2-5, 1.03 inches on April 16, 2.47 inches from April 20-22, and 1.14 inches from April 26-27.

Based on the potential for leachate to enter the lateral drain system and subsequently discharge to Short Creek and the construction difficulties present by the high volume inflow of groundwater, it was determined by the MDNR and EPA to abandon the lateral drain system. The location, construction, and design of the lateral system will be reevaluated following the capping of the soil repository located on top of the gypstack.

If you have any questions or require additional information, please contact me at 913-317-3591 at your earliest convenience.

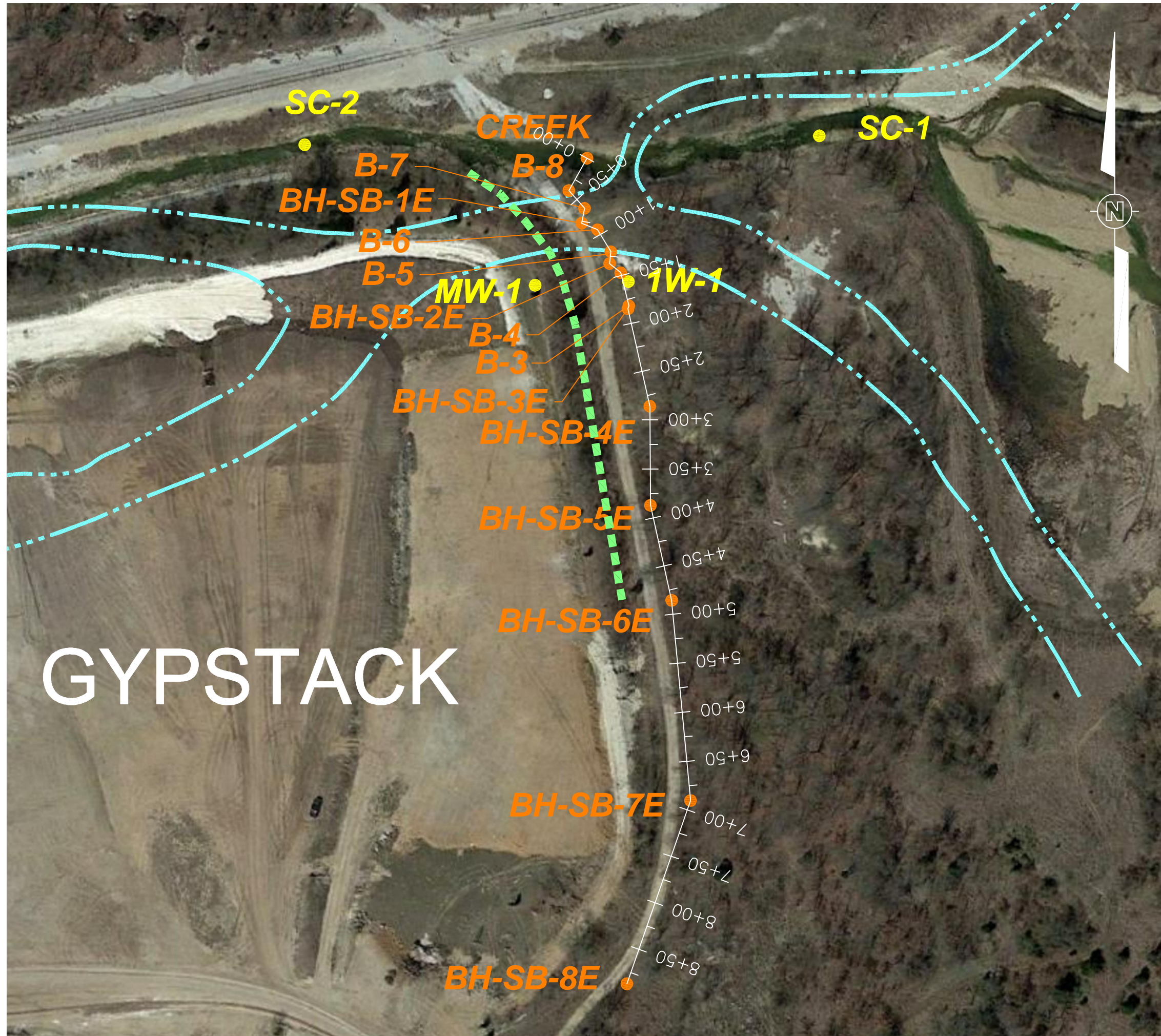
Sincerely,



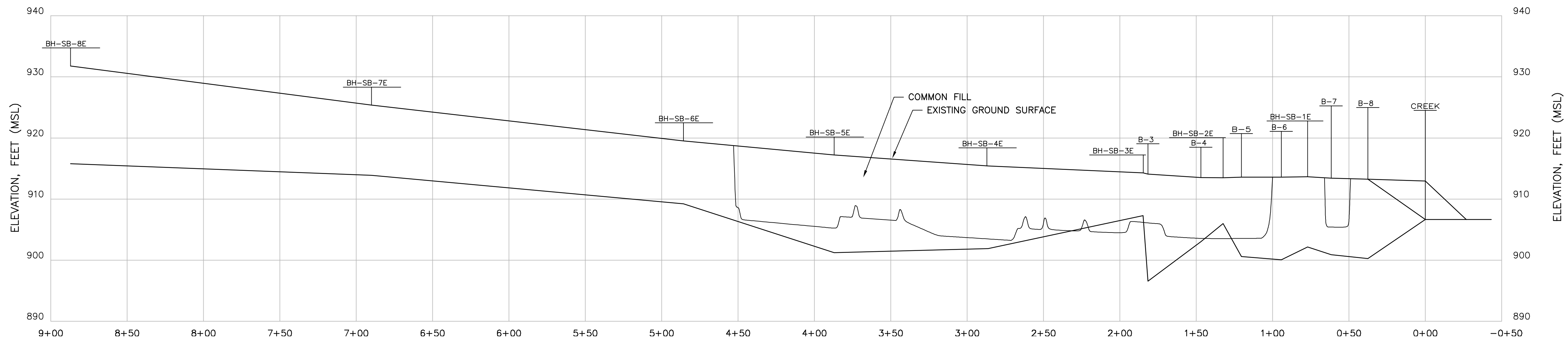
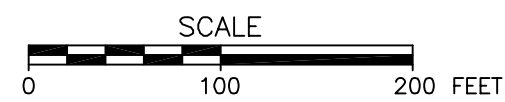
Mark L. Finney, RG
Project Manager

Cc: Kamyar Manesh, CELS

File: O:\Show Offices - CAD Files\Overland Park, KS\Joplin-108732\108732-B4D.dwg
Plot Date/Time: Jun 06, 2017 - 9:10am
Xref: 2016 photo.jpg
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CB&J.jpg
Plotted By: gregjones



PLAN



PROFILE STA. 0+00 TO 8+87.10



11206 Thompson Ave.
Lenexa, Kansas 66219
(913) 451-1224

FI MISSOURI REMEDIATION TRUST
FORMER FARMLAND INDUSTRIES
**APPROXIMATE TRENCH LOCATION
LATERAL DRAIN SYSTEM**
JOPLIN, MISSOURI

REV. NO.	0	DRAWING DATE:	1/9/16
DESIGNED BY:	ACAD FILE:		
DRAWN BY:	TLR	PROJECT NO.	108732
CLIENT:	FI Missouri Remediation Trust		
LOCATION:	Joplin, Missouri		
FIGURE:	1		

Attachment A
Photograph Log

Attachment B
Field Notes

April 17, 2017 Monday

0930 Arrived On Site - CAT 320 at Gate -

Heavy rain overnight - wet site conditions

1128 Skid loader on Site CAT 289D w/
narrow excavator bucket.

1205 ER On Site

1400 Offloaded materials, began clearing trees
along trench path.

1445 On Site w/ 2 24x24 concrete blks

1603 Completed clearing brush/trees along
trench path. Started excavating near xing
water running into excavation ~ 4 ft bgs -
very hard digging - compacted gravel.

1645 Began digging at south extent of trench
- will leave north excavation open over night to
check water level - excavation pulled to approx
4 ft bgs

1707 Excavated South end of trench below 10'
into drift shale - no free water in ~~exc~~ trench
weathered shale overlying chert - no water

1745 Excavated 50' @ S trench

1838 80 ft on S trench, hard rock @ 8' bgs

Trench ave. depth 10 ft bgs

1900 Off Site MARK Charest

April 18, 2017 Tuesday

0655 Arrived on Site, 58° Cln, clear

0715 Completed Tail gate

0920 Required excavation at 80 ft S → N
lower portion of trench - chert / weathered shale
filling by design area to receive gravel

0922 1 load of 1" straight run gravel delivered
rejected rip-rip load - too large
section of trench collapsed

0959 Excavated 117 ft S trench

Collapse @ 13 - 35 ft S Trench

1115 At Trench pH - 6.38, T - 15.3°C

SC Crossing pH - 7.03, T - 19.5°C

DTW = 4 ft bgs

1308 180 ft S → N Trenching water entering
excavation @ 7 ft bgs - rock ledge

- 279 tons of 1" gravel delivered to Site

1537 began discharging water from excavation
@ approx 80 gpm

1620 began clearing creek

1700 2" trash pump out of gss

1740 Tunnel pump dr. cleaned Creek

S Trench @ - 230', 387 - 400 ft N Trench

1755 Off Site - need 400 pump

MARK Charest

Put in the Rain

4/19/17

April 19, 2017 Wednesday

0700 ER Onsite to setup pumps

DTW 11-414 / 5-5'7" @ 230

0845 Began discharging from S trench using
2" pump

0938 Chalk to pull vacuum on 4" pump

1034 DTW 5-7'2" @ 230

1110 3" pump began discharging @ S trench
DTW- 8'1" @ 2301140 2 additional staff from ER to operate pumps
Completed Tadgate

1155 Resumed excavation @ 230

1245 encountered hard rock @ 8'1" bgs, 2+60

high quantity of water seeping @ 7-8'
overwhelming 2" pump. Ordered a rock hammer
to the CAT. 2 pumps running not able to
keep up with inflowing GW.

1300 1, 2" & 3" pumps running

1510 off site - Hammer due in morning
Matti Chirney

4/20/17

April 20, 2017 Thursday

0645 Arrived On Site - Raining, forecasted
for heavy rain over the next 3 days

water level in trench approx. 4'1" bgs at

North pier 2+60 5-10 ft

Tadgate Safety Meeting

0716 Started pumps to lower trench

Pumped water pumps - returned to work
shop. Flagged open excavation0837 CAT on Site w/ hydraulic hammer
continuing heavy rain -

0902 off site

184482 Lenece

Matti Chirney

Rained out forecasted for 3-5 inches of
rain @ 7-8 ft.

Location 184561 Date 4/24/17
 Project / Client _____

April 24, 2017 Monday
Crew On Site - ER

Creek Crossing washed out - South end of
 trench collapsed 3-70 ft S-DN

DTW - 23" N DTW - 36" S @ 2+80

Crew off site picking up water pumps.

0928 Prepared STA Target - ER connecting
 rock hammer on CAT

0933 ER on site with water pumps

DTW - 80" @ 0+80 S-DN

0959 All 3 pump operating - 2-3" #1-2"

1317 STA 2+60 S-DN pH 5.49

High volume of water discharging into

trench b/c 2+60 - 2+80 ~~S-DN~~ on top
 of (most weathered) bedrock - 7-8' bgs

SC crossing pH - 7.0

Excavated rock to 10.2 ft bgs

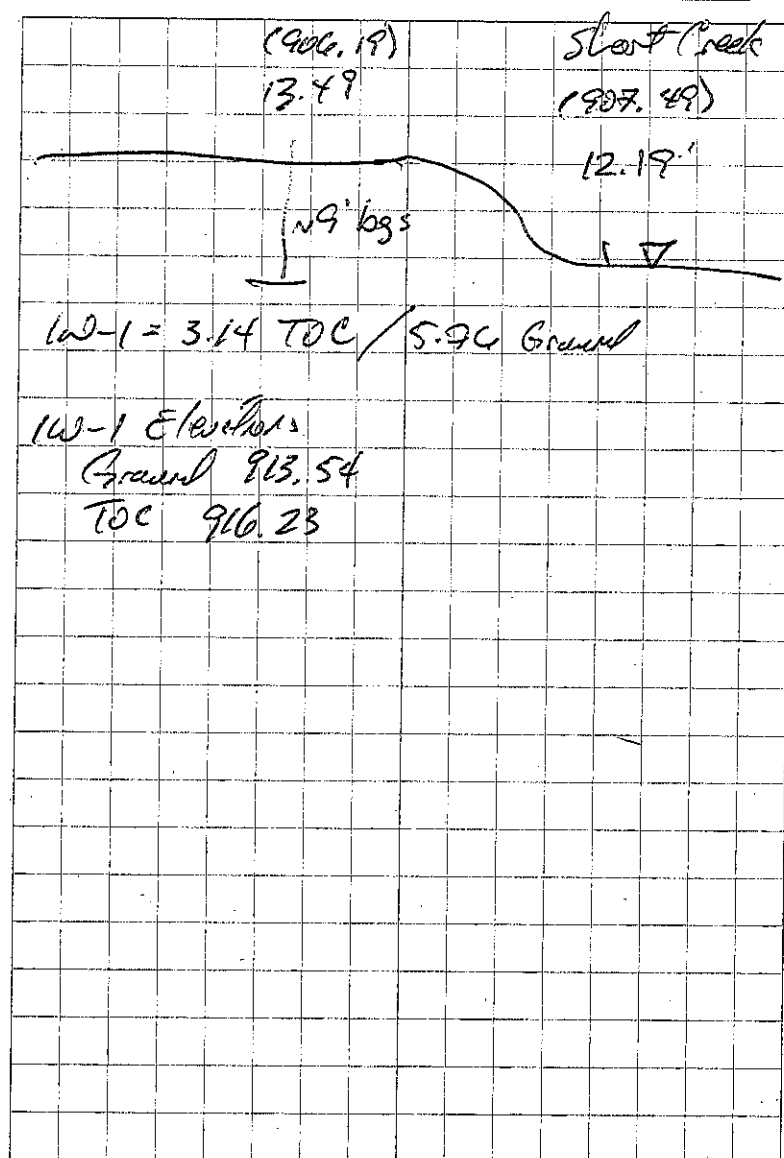
1356 North Excavation pH = 7.00

3 rolls - 180" x 360' Geotextile fabric

1816 Slope excavating - approx 70' of trench
 remaining - 3 pumps unable to clear the
 trench

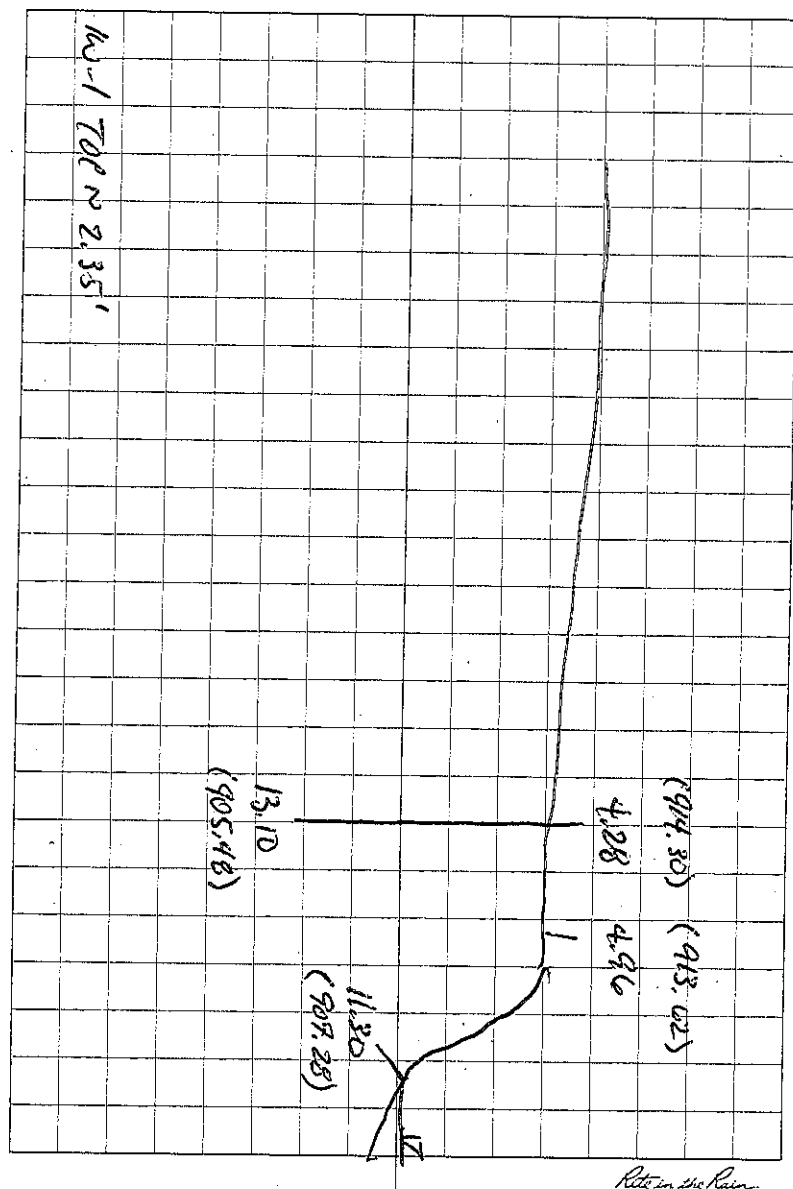
1605

Location _____ Date 4/24/17 23
 Project / Client _____



- April 25, 2017 Tuesday
- 0650 Arrived On Site - Shag 3 cords
- 0715 Started 5 pumps 1-2" 2-3"
- 0730 Trenchgate Safety Meeting
- 5' Trench pH = 6.04
- 11' Trench pH = 6.78
- SC pH = 7.30
- 0805 6" pump on Site
- 0853 6" pump running - water level in trench
is dropping
- 0928 Resumed Excavating Trench - very hard digging
just bedrock (trench dewatered)
- 1025 CAT 304 with rock breaker on Site
- 1254 Don Van Dyke + 1 MDNR on Site
Don Van Dyke & Mark Dodson - abandon
the trench - backfill
- 21420 MDNR on Site
- 1160 Met w/ STAR Plumbing - will pick up
unused materials and check on return price
- 1700 Loaded materials for return to STAR
- 1720 began backfilling Trench S → N, running 6" pump
- 1945 Backfilled 3/4 of trench
on Site

Mark (Proctor)



Plot in the Rain

4/25/17

Seeps			
1W-1	0400		
~ 100 gpm	0408	ID extent of Trench - major inflow	
	0414	Small	W
	0422	Small	E
	0432	Small	E
	0443	Med	W
	0449	Med	W
	0453	Small	E
	0462	Small	W
	0468	Small	E
	0483	M-L	W
	0487	Small	E
	0493-0498	Med	W
	1423	Inst	bedrock
	1449	Inst	bedrock
	1462-1472	Seeps	W
	1470	Med	Seep W
	1489	Small	E
	2403	Small	E
	2418	Small	E
	2444	Inst	bedrock
	2470	end of water	
	2434	S →	- 0449 A
	1400	Short Creek	

4/26/17²⁷

184873

April 26, 2017 Wednesday
 0708 Arrived On Site - light rain, dropping
 temps. Heavy rains overnight damaged
 Gypstock hold-down structure. very wet
 0715 To gate
 0720 Resumed dewatering Trench
 1201 Completed backfill trench and
 repairing creek crossing and road
 Staged equipment for pickup
 1240 off Site - Still Raining
 Mark C. Harvey

S Trench 1W-1 A Trench
 0 → 345 / 353 / 387 - 404

362' Total Trench Excavated

Rite in the Rain

8725 Rosehill Rd
STE 450
Lenexa, KS 66215
913-317-2623
Fax: 913-317-2660

FI Missouri Remediation Trust

October 10, 2017

Mrs. Elizabeth Hagenmaier
U.S. Environmental Protection Agency
Superfund Division,
11201 Renner Blvd
Lenexa, KS 66219

Re: October 2017 Monthly Report
Treatability Study Order
FI Missouri Remediation Trust Property

Mrs. Hagenmaier:

In Accordance with Paragraph 44 of the Administrative Settlement and Order on Consent (ASAOC), Docket No. CERCLA-07-2016-0004, enclosed is the Monthly Progress Report for the period of **September 1, 2017, through September 31, 2017**, for the FI Missouri Remediation Trust (Trust) property in Jasper County Missouri.

a) Descriptions of actions taken toward achieving compliance

Pursuant to approval of the proposed interceptor trench along the east side of the stack, the Trust completed the design, specifications, and request for proposal (RFP) to retain a suitable contractor to construct the interceptor trench. The contractors and the Trust met at the site and inspected the conditions and clarified questions regarding the construction. Trust received three bids from qualified contractors. The Trust reviewed the bids, selected a qualified contractor, and mobilized to the site on April 17, 2017.

During the week of April 17th, the contractor cleared brush along proposed alignment of the trench, excavated approximately 16 feet at the north extent of trench. During the week, the contractor also excavated approximately 345 feet in the south portion of the trench. Very high inflow of groundwater was encountered from 260 to 345 feet north. All efforts to dewater the excavation were unsuccessful. CB&I staff discussed the conditions with EPA and MDNR staff. The decision was made to abandon the trench excavation due to the inflow of possible leachate from the gypstack. During the week of April 24, 2017, the contractor completed backfilling the trench with excavated soil and demobilized from the site.

The Trust notified EPA on July 27, 2017, about the extent of soil placement against the north and east berm to the catch basin to the extent that the berm is no longer effective in directing surface water runoff away from the catch basin. If sediment

enters the catch basin, it would reduce the permeability of the catch basin floor whereby reducing the infiltration rate of the discharged leachate. A berm or drainage swale is necessary to direct surface water away from the catch basin to prevent this from happening. EPA indicated that due to capacity issues EPA will need to expand but will install silt fencing around the basin to keep sediments out.

On August 24, 2017, The Trust and Aptim met with MDNR and EPA to discuss the storm water management at the site. EPA also informed the Trust that Mr. Doolan is temporarily reassigned to another EPA project and all future communications should be directed to Elizabeth Hagenmaier, Steve Camp, and Todd Campbell. During this meeting it was decided that EPA will undertake the necessary actions to minimize the impact of surface water runoff to access roads and onsite infrastructures used to maintain the leachate management system. The Trust will modify the catch basin into an infiltration gallery allowing for soil deposits to continue without any obstruction. More specifically the following topics were discussed and assigned.

1. Catch Basin Modification, The Catch Basin was constructed as part of the Leachate Management System. Due to increased depth of deposited material, berms no longer manage the storm water runoff and sedimentation occurs following precipitation events. The Catch Basin was also hindering the repository fill schedule and truck traffic. MDNR and EPA directed the Trust to replace the Catch Basin with lateral lines and cover. The Trust completed the Catch Basin Modification in September 2017.
2. Stormwater Diversion Trench, a comprehensive Stormwater Management System is needed after the depository is completed. Currently after each rain event, Access Road and Creek Crossing erodes and hinders Trust access to its operation and maintenance destinations. It is also conceivable that some of the deposited soil may end up in Short Creek. EPA and MDNR both acknowledged this fact and agreed to fast track their fill operation so that a diversion trench can be installed to direct stormwater to the north side of the Haul Road. EPA will perform this task as soon as practicable. Meanwhile EPA will implement temporary measures to minimize the impact of stormwater including;
 - Short Creek Crossing Improvements, In order to remedy the wash out of the Creek Crossing after rain events, EPA planned to install a Letdown structure near the Creek Crossing. EPA also planned to improve the runoff along the Creek Access road by elevating it as a preventive measure. We believe EPA may have started its work on these tasks in September 2017, but the completion status is not known.
 - Maintain North Gypstack Berm slope, It is critical to maintain adequate slope to divert runoff from the north end of the gypstack. As the gypstack height is increasing, if the slope is not away from the north slope, it will exasperate the wash out of north slope and will compromise the integrity and stability of the

stack. EPA plans to monitor for erosion as well as direct the site operator to establish the slope as part of the ongoing operation.

b) Summary of results of sampling, tests, and other data

The summary table for all the dye test data was submitted with the previous reports. The evaluation and design documents, and the contractor bids were also submitted to EPA and MDNR for review and approval.

c) Plans, Reports, and deliverables required and submitted

The Summary Dye Test Report was submitted on January 10, 2017. Preliminary maps, data tables, and preliminary evaluations and recommendations were presented during the December 12, 2016 meeting in Webb City.

The design, specifications and the request for proposal were completed in February 2017 and were submitted to EPA and MDNR for review.

Details of the lateral drain construction activities were summarized in a construction report and submitted in June 2017.

d) Planned activities for the next six weeks

The Trust, EPA and MDNR will need to evaluate the conditions identified during the trench excavation. Discussions will need to include the technical feasibility of other options a, status of the Order moving forward. The EPA and MDNR should consider suspending the requirements of the ASAOC until such time that there is a clear direction and timing is set for any future action. The EPA also needs to continue its efforts to improve the storm water management solutions and keep the Trust informed of all progress.

e) Percentage of completion and unresolved delays

All Workplan related items are completed. Site conditions dictated abandoning the original scope of work. No new scope of work has been developed.

f) Modifications to Work Plan scope and schedule

The parties need to develop a new plan that finalizes the Trust's obligations under the ASAOC or terminate the ASAOC.

Monthly Report
October 10, 2017
Joplin, MO

If you have questions concerning this report or require additional information, please contact me at 913-317-2623.

Sincerely,

A handwritten signature in blue ink, reading "Kamyar Manesh". The signature is fluid and cursive, with the first name "Kamyar" and last name "Manesh" clearly distinguishable.

Kamyar Manesh, P.E.
Trust Administrator
FI Missouri Remediation Trust

CC: Donald Van Dyke, MDNR, Hazardous Waste Program
Steve Kemp, EPA R7
Todd Campbell, EPA R7
Mark Finney, APTIM